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DEVELOPMENT OF THE ERGONOMIC AND MULTIPURPOSE SEAT

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Abstract. The relevance of work is determined by the need to solve the problem of ergonomic and comfortable position of a body in a working zone, and also productive use of time which is wasted by a person while traveling by the vehicle. The purpose of work is creating the conceptual solution of a multipurpose seat which will meet the above mentioned objectives. As a result of the work the multipurpose transformer seat is developed which operates in different conditions.

Introduction. The seat belongs to most important components for the interior of vehicles. Different developments for an ergonomic and comfortable positioning of a body are offered. With every new concept the companies offer the new design decisions for chairs differing in functionality, manufacturing techniques and materials. The seat shall always meet the requirements of ergonomics which does not change irrespective of a workplace.

The concepts of interiors of BMW and Mercedes producers - Benz are studied, because now these companies are the most popular among car manufacturers. The comparative analysis of materials, production technologies, functionality, ergonomic properties is carried out (fig.1, 2) [1,2].

Fig. 1 Conceptual solution of interior from BMW producers

Fig. 2 Conceptual solution of interior from Mercedes-Benz producers

The BMW company has submitted the concept of the Gina car in which the form, both the case, and home decoration can change. In a framework of the car there is a system of actuated parts which work due to the hydraulic mini-installations, steered by the on-board computer, providing transformation of the case and home decoration. The framework will be completed with Spandex fabric.

Mercedes - Benz F15 has presented a striking example of functionality of Luxury class which is designed to provide a comfortable trip. The disadvantage of this conceptual decision is a lack of the possibility to reset a seatback depending on anthropometrical properties of the passenger. The advantage is the possibility of rotation around a vertical shaft creating the small hall of negotiations during driving. Much attention is paid to the creation of an adaptive interior and multipurpose use. The concept of Mercedes-Benz F15 represents a striking example of expanding functionality of a working zone (fig. 3).

Fig. 3 Conceptual solution of interior from Mercedes-Benz F15 producers

Often drivers are forced to spend long time driving in case of a long-distance trip or when stuck in traffic jams. In case of using the developing technology which will allow to switch to automatic control there is a task to create a multipurpose seat. It will allow to use productively time which drivers waste driving the car. The situation for using such seats in buses, at the airports, in waiting rooms, and also in house conditions (balconies, similar small-sized spaces) is also considered.

Work progress. The objective is to develop a multipurpose seat which will be operated in different conditions, while it does not require big space and is capable to be transformed in two positions easily and quickly.

Proceeding from safety requirements, the seat will not have acute angles. In order to determine the form the structures of different bionic shapes were studied [3]. From bionic forms, the snapdragon flower was chosen. When opened, it reminds a seat and a back with plastic forms (fig. 4).

Fig. 4 Snapdragon bionic form

To achieve the transformation objectives, it is necessary to break the form of a seat into several modules [4].

Production. The frame of a seat will be made completely by printing on the 3D-printer. Using carbon fiber and metalplastic material is possible. Such material will reduce a seat weight, allow to make less massive details, at the same time properties of durability will not decrease (fig. 5).

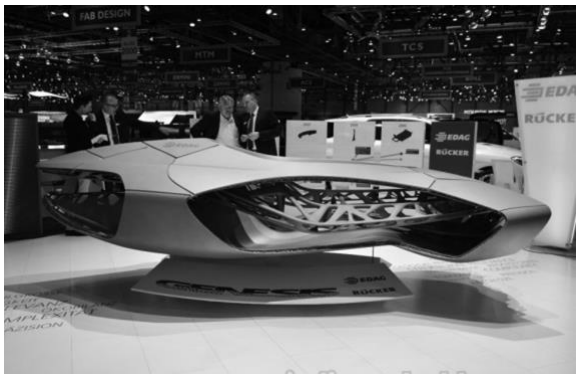

Fig. 5 The frame printed on a 3D printer

The frame will be completed with a polymer mesh cloth. The fabric is environmentally friendly and wear proof, it has the increased durability in case of stretching which saves the original form for many years, it also allows a body to breathe, saving temperature condition, except any zones of overheating in places of contact.

Conclusion. The designed multipurpose seat is the result of the conducted research (fig. 6, 7). The innovative design of the case for sitting, as well as the use of special materials provide the small weight and high durability of the design. Using carbon fiber and metalplastic material gives the chance to recycle and reuse it for a new product.

Fig. 6 Multipurpose seat

Fig. 7 Multipurpose seat (explosion scheme)

References

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